

## REMARKS

Enclosed herewith is an amended Fig. 3, in which the three embodiments are differently labeled Fig. 3a, Fig. 3b and Fig. 3c as required by the Examiner. The description has been amended in accordance therewith on page 4, line 12 and on page 5, line 13.

The description has further been amended on page 6, line 30 by removal of the reference to “claim 1”.

In view of the claim rejections under 35 USC § 112, in claim 3, the phrase “or an equally effective structure” has been removed and in claim 6, the parenthetical notation (Rapid prototyping) has been removed.

Reconsideration of the rejection of claims 3 and 6 as being indefinite is respectfully requested.

The Examiner has rejected claims 1 – 3 and 5 – 8 under 35 USC 102(e) as being anticipated by Chris et al. (US 6 368 871).

Chris et al. (US 6 368 871) discloses a microstructure for manipulating fluid samples including multiple channels with structures for the mixing of fluids. They include supply channels which converge to form a mixing chamber with a series of islands in the merged channel to promote mixing. The channels provide thick flow sheets with a laminar flow and therefore do not mix easily since the laminar flow tends to remain laminar also in the converged flow area providing an “emulsion” for protein extraction. The channels are formed by deep-etching from one side of a material block and provide for parallel fluid sheets, because of the relatively thin flow sheets. Mixing occurs by diffusion over a relatively short distance rather than by turbulence.

The present invention resides in a micro-mixer with a mixing chamber 4 and an upstream guide component 1 for the separate admission of two different fluids a, b to be mixed in the mixing chamber 4. The guide component 1 includes, for each of the fluid flows a and b, at least two slot-like channels 5a, 5b, which extend at an angle with respect to, and from opposite side of, a plane extending along a longitudinal axis of the micromixer and normal to the slot-like flat channels 5a, 5b such that the channels 5a, 5b intersect each other in mutually spaced relationship and in alternating fashion at an exit area to the mixing chamber (4). There the channels form a common exit cross-section with alternately arranged outlets of the slot-

like flat channels 5a, 5b for the different fluids a, b with webs 3a, 3b disposed between the adjacent channels, which, at the exit cross-section, have a height of less than 500  $\mu\text{m}$ . The channels 5a, 5b in the guide component have a cross-section which decreases toward the exit area.

With this arrangement, the flow of the gases a and b is not only supplied to the mixing chamber in alternating thin flow sheets, but also in a transversely intersecting fashion so that the different fluid flows cannot form laminar flow sheets moving parallel along one another but are angled toward the side walls of the mixing chamber so as to cross one another. This generates turbulence for intermixing the thin alternating flow sheets of the two different fluids which turbulence is further enhanced by the fluid flows being directed toward the respective side walls of the mixing chamber from where they are again reflected back toward the center of the mixing chamber.

The Examiner will certainly agree that such an arrangement is not disclosed in the cited prior art.

Claim 1 has been carefully reviewed and amended so as to clearly distinguish the static micro-mixer according to the invention from that disclosed in the cited prior art in which the various flow channels converge all in one plane area so as to form in the mixing channel parallel interleaved flow sheets of the different fluids which, over a certain length, intermix by diffusion.

Clearly, the cited reference does not disclose, nor does it suggest, to arrange in front of the mixing chamber a guide component which includes for each of the fluid flows at least two slot-like flat channels which extend at an angle with respect to, and from opposite sides of, a plane extending along a longitudinal axis of the micro-mixer and normal to the slot-like flat channels such that the channels intersect each other in mutually spaced relationship and in an alternating fashion at an exit area to the mixing chamber.

Reconsideration of claim 1 as amended is respectfully requested.

Claims 2 and 3 are dependent on claim 1 and consequently include all the features of claim 1 so that they should be patentable together with claim 1.

Claim 4 has been objected to by the Examiner as depending on a rejected claim, but the Examiner has indicated that, it would be allowable if rewritten to include all the limitations of the base claim.

Since claim 1 is now believed to be in an allowable form, also claim 4 should be allowable.

Claims 5 to 7 define different ways of obtaining the flow passages in the guide component, that is, different ways of preparing the guide components with the passages formed therein and claim 8 defines a preferred height of the webs between the flow passages at the exit area to the mixing chamber.

These claims are all directly dependent on claim 1 and should therefore be allowable already for that reason.

Reconsideration of the dependent claims and allowance of claims 1 – 9 is solicited.

Respectfully submitted,

*K. Bach*

Klaus J. Bach, Reg. No. 26832